JANUARY 1989

ACADEMIC MEDICINE

Changes—The Johns Hopkins Experience

International Health

Reputation of Abraham Flexner

Kellogg Foundation's Initiatives in Medical Education

Medical Informatics

Curricula and Student Perceptions of Well-Being

Cognition and Skills of Sleep-Deprived Residents

Past and Future Training for Clinical Researchers

Internal Medicine Teaching in Ambulatory Settings

Noncognitive Criteria for Assessing Medical Students

Health Opportunities—The 101st Congress

Editorials: Resident Stress; Journal Change

VOLUME 64 • NUMBER ONE

JANUARY 1989
VOLUME 64
NUMBER ONE

ACADEMIC MEDICINE

JOURNAL OF THE
ASSOCIATION OF
AMERICAN MEDICAL
COLLEGES

Invited Articles	Changing Environment and the Academic Medical Center: The Johns Hopkins School of Medicine *by Richard S. Ross, M.D., and Michael E. Johns, M.D.*	1
	Changing Environment and the Academic Medical Center: The Johns Hopkins Hospital *by Robert M. Heyssel, M.D.*	7
Innovations in Medical Education	The Difficulty of Diffusing Innovations *by Wayne K. Davis, Ph.D.*	12
Medical Informatics	Medical Informatics: Glimpses of the Promised Land *by Daniel R. Masys, M.D.*	13
International Medical Education	International Health *by David S. Greer, M.D.*	14
Book Reviews	So Many Books, Too Little Time *by Sherman M. Mellinkoff, M.D.*	16
Foundations	Recent W. K. Kellogg Foundation Initiatives in Medical Education *by Thomas A. Bruce, M.D.*	16
History of Medical Education	The Historical Reputation of Abraham Flexner (1866–1959) *by Thomas Neville Bonner, Ph.D.*	17
National Policy Perspectives	Future Health Opportunities—the 101st Congress *by Henry A. Waxman*	19
From the President		20
AAMC FOCUS		21
Editorials	Resident Stress: Sleep Deprivation *by P. V. Dilts, Jr., M.D.*	22
	Change and Continuity *by The Editor*	22

Letters to the Editor 23

Research Reports
ARTICLES

Effect of a Major Curriculum Revision on Students' Perceptions of Well-Being *by Gregory Strayhorn*, M.D., Ph.D. 25

Effects of Sleep Deprivation on Cognitive Ability and Skills of Pediatrics Residents *by James S. Storer*, M.D., *H. Hugh Floyd*, Ph.D., *William L. Gill*, M.D., *Cheryl Wimbish Giusti*, M.A., *and Harley Ginsberg*, M.D. 29

Prior Training and Recommendations for Future Training of Clinical Research Faculty Members *by Lawrence S. Neinstein*, M.D., *and Richard G. MacKenzie*, M.D. 32

Teaching Medical Students in Ambulatory Settings in Departments of Internal Medicine *by Joan Feltovich*, *Terrill A. Mast*, Ph.D., *and Norman G. Soler*, M.D., Ph.D. 36

Noncognitive Criteria for Assessing Students in North American Medical Schools *by Grant D. Miller*, M.D., *Daniel Frank*, M.D., *Ronald D. Franks*, M.D., *and Carl J. Getto*, M.D. 42

SHORT PAPERS

A Program of Management Training for Residents *by* D. H. *Cordes*, M.D., *Dorothy Foster Rea*, M.A., *Joseph Rea*, M.D., *and Anthony Vuturo*, M.D. 45

Attribution of Control in Psychiatric Residents *by Ole J. Theinhaus*, M.D., *Jerald Kay*, M.D., *and Edwin Larson*, M.D. 47

Evaluation of Emergency Medicine Residents by Nurses *by Judith E. Tintinalli*, M.D. 49

BRIEF COMMUNICATIONS

A Course in Diagnostic Test Evaluation for Senior Medical Students *by Kim Goldenberg*, M.D., *H. Verdain Barnes*, M.D., *Toni I. Evans*, M.D., *Steven M. Cohen*, M.D., *Mark M. Redding*, M.D., *and Robert H. Edwards*, M.D. 51

A Useful and Cost-Effective Way To Provide Feedback from Students to Community-Physician Preceptors *by Elaine J. Lenkai*, M.S., *and Raymond P. Bissonette*, Ph.D. 51

Bibliography 52

PUBLISHER: HANLEY & BELFUS, INC.
210 South 13th Street,
Philadelphia, Pa 19107

JANUARY 1989
VOLUME 64
NUMBER ONE

ACADEMIC MEDICINE

JOURNAL OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

EDITOR Addeane S. Caelleigh

DEPUTY EDITOR Albert Bradford

SUBMISSIONS EDITOR Cynthia T. Turner

PUBLISHER'S EDITOR Sandra A. Lovegrove

ASSOCIATE EDITORS
Innovations in Medical Education
Wayne K. Davis, Ph.D.
University of Michigan Medical School
International Medical Education
David S. Greer, M.D.
Brown University Program in Medicine
Informatics
Daniel R. Masys, M.D.
Lister Hill National Center for Biomedical Communications
Book Reviews
Sherman M. Mellinkoff, M.D.
University of California, Los Angeles School of Medicine

CONSULTING EDITORS
L. Thompson Bowles, M.D., Ph.D.
George Washington University School of Medicine and Health Sciences
Milton Corn, M.D.
Georgetown University School of Medicine
Robert M. Heyssel, M.D.
The Johns Hopkins Health System
Donald G. Kassebaum, M.D.
Association of American Medical Colleges
Russell Miller, M.D.
Howard University
Jay P. Sanford, M.D.
Uniformed Services University of the Health Sciences
F. Edward Hébert School of Medicine
Martha Vaughan, M.D.
National Institutes of Health

OFFICERS OF THE ASSOCIATION
Chairman
D. Kay Clawson, M.D.
University of Kansas Medical Center School of Medicine
Chairman-Elect
David H. Cohen, Ph.D.
Northwestern University
Immediate Past Chairman
John W. Colloton, M.A.
University of Iowa Hospitals and Clinics
President
Robert G. Petersdorf, M.D.
AAMC
Chairman, Council of Deans
William T. Butler, M.D.
Baylor College of Medicine
Chairman, Council of Academic Societies
Ernst R. Jaffé, M.D.
Albert Einstein College of Medicine
Chairman, Council of Teaching Hospitals
Gary Gambuti
St. Luke's-Roosevelt Hospital Center

EDITORIAL BOARD
L. Thompson Bowles, M.D., Ph.D. (Chairman)
George Washington University School of Medicine and Health Sciences
Philip C. Anderson, M.D.
University of Missouri, Columbia School of Medicine
G. William Bates, M.D.
Medical University of South Carolina College of Medicine
Nancy E. Gary, M.D.
Albany Medical College
David S. Greer, M.D.
Brown University Program in Medicine
Paul F. Griner, M.D.
Strong Memorial Hospital Rochester, New York
Kaaren I. Hoffman, Ph.D.
University of Southern California School of Medicine
John E. Ives
St. Luke's Episcopal Hospital Houston, Texas
Fernando S. Mendoza, M.D.
Stanford University School of Medicine
Gordon S. Page, Ed.D.
University of British Columbia Faculty of Medicine
Hugh M. Scott, M.D.
Bishop's University Lennoxville, Quebec
Charles E. Spooner, Jr., Ph.D.
University of California, San Diego School of Medicine
Manuel Tzagournis, M.D.
Ohio State University College of Medicine

Academic Medicine (ISSN 1040-2446) is owned by the Association of American Medical Colleges, One Dupont Circle, N.W., Washington, D.C. 20036, and published monthly by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

Copyright 1989 by the Association of American Medical Colleges. All material subject to this copyright may be photocopied for the noncommercial purpose of scientific or educational advancement. Printed in the U.S.A.

Subscription rates: U.S., Canada, Latin America—$60.00 per year and $7.00 per single copy ($30.00 per year for students); all other locations—$70.00 per year and $8.00 per single copy.

All advertising material published in this journal is intended to conform to ethical standards, but acceptance does not imply endorsement. The views expressed in all articles and features in this journal are those of the authors and do not necessarily reflect the position of the AAMC.

CORRESPONDENCE
Manuscripts: The Editor, *Academic Medicine*, Association of American Medical Colleges, One Dupont Circle, NW, Washington, DC 20036.
Advertising: Diane Sherel, Advertising Manager, Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, PA 19107; (215) 546-0313.
Subscriptions and changes of address: Membership and Publication Orders, AAMC, One Dupont Circle, NW, Washington, DC 20036.
Reprints: Request reprints directly from the authors of articles, not from *Academic Medicine*.
POSTMASTER: Send address changes to *Academic Medicine*, AAMC, Suite 200, One Dupont Circle, NW, Washington, DC 20036.

9. Preston, F. S. Further Sleep Problems in Airline Pilots on Worldwide Schedules. *Aerospace Med.* 44(1973):775–782.
10. *American Medical News*, September 4, 1987, p. 12.
11. Petersdorf, R. G. AAMC Recommendations on Housestaff Supervision and Hours. Association of American Medical Colleges Memorandum #88-12, March 8, 1988. Washington, D.C.: AAMC, 1988.
12. Siegel, Benjamin, and Donnelly, Julie C. Enriching Personal and Professional Development: The Experience of a Support Group for Interns. *J. Med. Educ.* 53(1978):909–914.

Prior Training and Recommendations for Future Training of Clinical Research Faculty Members

LAWRENCE S. NEINSTEIN, M.D., and RICHARD G. MacKENZIE, M.D.

Abstract—A survey was conducted of the first authors of half of the research papers published in 18 leading peer-reviewed medical journals over a six-month period in 1986. The first authors of every other article (that is, alternate articles) published during this period were sent a questionnaire that assessed their previous research training and their recommendations for training of clinical research faculty members. Of the 772 physicians sent the questionnaire, 482 responded. Of these, 57% had had some research training in medical school, 52% had received such training during residency, and 87% had received it during their fellowships. Fifty-six percent had taken a formal statistics course, 31.4% had taken some computer training, and 87% had received research supervision in a nonstructured format (that is, no formal course work). Introductory biostatistics was the only formal course in any of the seven subject areas listed in the questionnaire that more than one-third of the respondents had taken, yet at least two-thirds recommended that researchers take formal courses in all of the seven areas listed. The investigators recommend for medical students and postgraduate trainees a graduated experience of research training and exposure that includes formal courses. *Acad. Med.* 64(1989):32–35.

One of the primary tasks of academic medicine is to foster research, which in turn makes important contributions to patient care and medical education. Yet medical research is facing at least two growing problems. First, clinical research faculty members may be having difficulties in developing and maintaining skills in research. This problem is probably compounded as shrinking economic support from both intramural and extramural sources forces faculty members to seek increasing percentages of their incomes through private practice.

Second, the number of medical students and residents interested in pursuing investigative endeavors is declining sharply. Overall, the number of physicians reporting research as a primary activity decreased by 50% from 1966 to 1975.[1] In 1960 a survey of senior medical students[2] showed that 39% had an interest in a combined research–teaching–practice position, whereas a similar investigation[3] showed that by 1982 this percentage had declined to 22.2%. A survey of Harvard medical graduates showed that in 1963, 49% of them gave research a high priority ranking, whereas this ranking fell to 2% of the graduates in 1976.[4] Morris[5,6] studied Iowa medical students and found that only 2% had an interest in a primary career in research or teaching, or both. On an Association of American Medical Colleges' poll of medical graduates, 70% reported their training in research techniques to have been either none or poor during medical school.[7] Levey and colleagues[8] also commented on the difficulty in attracting trainee physicians into the biomedical fields of investigation. He proposed several reasons for this difficulty, including an increase in the government's emphasis on primary care and family practice, the unstable nature of funding for research grants, and the fear physicians have of losing their recently acquired clinical skills.

These problems pressure medical educators to assure the best possible training for future researchers. At present such training is not emphasized during the student and residency years, since that period is devoted primarily to acquiring a knowledge base in clinical care. Only during the fellowship and junior faculty years do educators expect trainees or faculty members to acquire research skills. Several questions then arise regarding this transition from medical student or resident to academic faculty member. What constitutes appropriate training for research, and how is it acquired? When should this training be obtained? What formal courses are needed?

Methods

To investigate these questions, the authors conducted a survey of a group of physicians who had demonstrated their competence in research by pub-

Dr. Neinstein is associate professor of clinical pediatrics and medicine, and Dr. MacKenzie is assistant professor of pediatrics and medicine, University of Southern California School of Medicine, Los Angeles; and Dr. Neinstein is coordinator of the Teenage Health Center, and Dr. MacKenzie is director, Division of Adolescent Medicine, Childrens Hospital of Los Angeles.

Correspondence and reprint requests should be addressed to Dr. Neinstein, Coordinator, Teenage Health Center, Childrens Hospital of Los Angeles, 4650 Sunset Boulevard, Los Angeles, CA 90027.

lishing their studies in major medical journals. It was assumed that these researchers would be a rich resource of guidance for planning a research training program for interns, residents, and fellows. Therefore, the researchers selected were asked, by means of a questionnaire, about their formal and informal research background and training. They were given a list of subject areas and asked to indicate which ones they had studied and which ones they would recommend for the training of students planning an academic career.

Participants in the survey were chosen by selecting the first author of every other research article (that is, alternate articles) published from January 1986 through June 1986 in 18 prominent peer-reviewed medical journals.*

Reviews, case reports, and special articles were excluded. Seven hundred and seventy-two (772) questionnaires were sent out; 482 physicians (62.4%) and 19 nonphysicians responded. The 19 nonphysicians were excluded from this evaluation. Five questionnaires were returned because no forwarding address was available.

American Journal of Cardiology, American Journal of Diseases of Children, American Journal of Gastroenterology, American Journal of Medicine, American Journal of Obstetrics & Gynecology, American Journal of Public Health, American Journal of Surgery, Annals of Internal Medicine, Circulation, Endocrinology, Gastroenterology, The Journal of Allergy and Clinical Immunology, The Journal of Clinical Endocrinology and Metabolism, Journal of Pediatrics, New England Journal of Medicine, Obstetrics and Gynecology, Pediatrics, and *Surgery.*

Table 1
Mean and Median Percentages of Their Total Working Time That 482 Physicians Reported They Devoted to Four Different Responsibilities*

Responsibility	Mean Percentage	Median Percentage
Clinical activities	30.0	35.0
Research	36.0	35.0
Teaching	15.0	15.5
Administration	10.0	12.5

*Questionnaires were sent to one-half (772) of the first authors of research articles in 18 major peer-reviewed medical journals from January through June 1986. For a list of the medical journals, see the footnote in the text.

Results

The mean age of the 482 physicians who responded was 42.6 years. Ninety percent were male. Most respondents (83%) had had three or more years of residency, and most (87%) had had two or more additional years of fellowship. The specialties of the respondents included internal medicine, pediatrics, obstetrics–gynecology, and surgery. Seventy-four percent were on a tenured academic track; 12.9% were nontenured, full-time academic faculty members; 6% were part-time academic faculty members; 2.6% were in office-based private practice; and 2.6% were in hospital-based private practice. The percentages of their total working time that the respondents spent in clinical activities, research, teaching, and administration are shown in Table 1.

Fifty-seven percent of the participants had had some research training during medical school, 52% had had some during residency, and 87% had had some during their fellowships. Fifty-six percent had taken a formal statistical course, 31.4% had had computer training, and 87% described receiving their training in research by nonstructured supervision (that is, they had no formal classes). The participants were queried about their own formal training in specified areas of research techniques and skills and their recommendations for future trainees about training in these same areas. These responses are shown in Table 2.

Although introductory biostatistics was the only formal course that more than one-third of the group had taken, at least two-thirds recommended formal courses in all of the areas specified in the questionnaire. They felt that it would be best to teach biostatistics and computer training in college in preparation for medical school and residency. Most

Table 2
Percentages of 482 Physicians Who Reported Taking Formal Courses in Seven Subject Areas, Percentages of Them Who Recommended That Others Take Courses in Those Seven Areas, and the Time in the Educational Process They Recommended for Taking These Courses*

Subject Area	Took Formal Course	Recommended Others Take Course	Time Recommended To Take Course			
			College	Residency	Fellowship	Postfellowship
Introductory biostatistics	73.8	99.6	58.0	7.5	32.5	2.0
Advanced biostatistics	23.7	85.5	13.6	7.8	67.3	9.4
Computer use	19.0	95.0	56.0	6.2	33.2	4.4
Experimental design	26.7	90.0	12.6	12.3	69.4	4.0
Epidemiology	32.2	71.0	23.0	21.6	49.8	4.5
Sampling techniques	20.5	71.0	16.2	10.1	67.5	6.1
Health statistics	18.9	65.7	26.0	18.5	50.5	5.0

*Questionnaires were sent to one-half (772) of the first authors of research articles in 18 major peer-reviewed medical journals from January through June 1986. For a list of the 18 medical journals, see the footnote in the text.

Table 3
Percentages by Medical Specialty, of 482 Physicians with Selected Characteristics and Mean Percentages of Their Working Time Spent in Selected Activities*

Specialty	Characteristic			Mean Percentage of Work Time Spent	
	Female	Male	On Tenure Track	On Research	On Clinical Activities
Internal medicine ($n = 202$)	7.4	92.6	75.1	40.8	30.2
Obstetrics-gynecology ($n = 43$)	10.2	89.8	82.8	23.8	46.3
Pediatrics ($n = 103$)	20.4	79.6	77.3	36.0	34.4
Surgery ($n = 134$)	4.1	95.9	74.6	21.8	50.8

*Questionnaires were sent to one-half (772) of the first authors of research articles in 18 major peer-reviewed medical journals from January through June 1986. For a list of the journals, see the footnote in the text.

felt that residency was not a good time for formal research instruction and that the fellowship years were more appropriate. Most of the study group had had two or more years of fellowship and advocated at least one clinical year and one research year for future trainees. They expressed strong support for National Institutes of Health programs, clinical scholar programs, or integrated formal courses in research methods, biostatistics, and design, or all of these approaches. However, the respondents' emphasis on formal training (that is, classes) during the fellowship years far outstripped their own formal training.

When the respondents were classified into two groups by their ages (younger than 45 and older than 45), there were no significant differences in their job profiles or their recommendations for research training. This lack of difference also held true when the same sort of classification was done using age 50 as the dividing point. Classification into groups by specialty, as shown in Table 3, indicated that the medicine and pediatrics faculty members devoted more time to research than did obstetrics-gynecology and surgery faculty members. More obstetrics-gynecology faculty members had taken advanced biostatistics courses than had respondents in any other specialty, and fewer medical faculty members had taken such courses (Table 4). Also shown in Table 4 are the respondents' recommendations for courses in specified areas. The sex distribution of the respondents and the times they spent in clinical and research activities, stratified by the specialities of the respondents, are listed in Table 3.

Discussion

This study centered on those investigators whose focus had been in the clinical areas, as reflected by the choice of journals reviewed. This bias could have influenced the subsequent profile of the study group. The median age of the sample, 42.4 years, could have indicated that the first authors chosen for this study were at a point in their careers when they sought recognition and promotion through publication. However, when the respondents were stratified by age, either above or below age 45 or above or below age 50, the responses did not differ significantly.

The present authors maintain that a graduated experience of research training and exposure should be planned for medical students and residents. This suggestion is supported

Table 4
Percentages, by Medical Specialty, of 482 Physicians Who Reported Taking Formal Courses in Each of Seven Subject Areas and Percentages Who Recommended That Others Take Courses in These Areas*

Subject Area	Internal Medicine ($n = 202$)		Obstetrics-Gynecology ($n = 43$)		Pediatrics ($n = 103$)		Surgery ($n = 134$)	
	Took Course	Recommended Course	Took Course	Recommended Course	Took Course	Recommended Course	Took Course	Recommended Course
Introductory biostatistics	71.1	99.0	72.9	100.0	80.0	100.0	74.0	98.6
Advanced biostatistics	16.8	83.1	36.4	89.1	28.6	88.0	26.8	81.2
Computer use	17.7	96.9	21.8	100.0	28.3	94.9	15.1	91.3
Experimental design	23.6	85.6	34.5	100.0	33.0	94.0	19.2	95.7
Epidemiology	26.2	66.3	32.1	83.6	40.2	80.4	22.5	53.1
Sampling techniques	16.4	64.3	30.9	74.1	24.0	78.8	17.8	75.8
Health statistics	16.8	60.7	19.6	79.6	21.6	74.2	13.7	58.5

*Questionnaires were sent to one-half (772) of the first authors of research articles in 18 major peer-reviewed medical journals from January through June 1986. For a list of the 18 medical journals, see the footnote in the text.

by a Health and Human Services study[2] in 1981 that strongly recommended research experience in medical school as a substantive factor in encouraging students to pursue an investigative career. In that study, the respondents felt that the opportunity for research in premedical training or medical school was one of the three major factors in choosing such a career. In medical school, more time could be planned for special seminars that provide exposure to outstanding faculty members involved in clinical or basic research. More intensive formal and informal instruction could follow in the fellowship years.

The respondents' responses provide suggestions for ways to structure the training of clinical researchers:

1. Basic statistics, research-method techniques, and computer techniques should be required at the undergraduate college level. Computer skills would help to facilitate the data management so integral to effective clinical research.

2. Early exposure in medical school to participation in clinical research projects should be encouraged. This exposure could be given by an ongoing seminar during the first year or by a summer course. The addition of one-to-one relationships of medical students with clinical research faculty members, who would serve as preceptors, would also encourage increased participation of these students in research pursuits.

3. Most respondents in the present study felt that the residency was not a good time for developing formal clinical research skills. However, a research seminar designed for house staff members and led by a clinical research faculty member on a regular basis was considered a possible valuable arrangement.

4. Assuming that the interest and desire to pursue research goals have been kindled in students by previous involvements in research, the postgraduate fellowship years are the ones that the respondents felt were most appropriate for developing skills in research. Training could include participation in a physician–investigator fellowship program, as outlined by Levey and colleagues[8]: nine months of formal lectures and laboratory training encompassing basic laboratory techniques, statistical analysis, teaching methods and the writing of manuscripts and grant applications; and 15 months devoted to a research project supervised by a faculty member. Alternatives include a National Institutes of Health fellowship, a Robert Wood Johnson Clinical Scholar fellowship, or a traditional two-to-three-year clinical research fellowship with one to two years of research time involving clinical course work and research methods. The departments of medicine, surgery, pediatrics, and obstetrics could collaborate to share resources in the formal training part of such a fellowship.

The authors thank Dr. Robert McAllister for his expert review of this manuscript and Ms. Sue Winett for her assistance with the research and manuscript preparation.

References

1. DiBona, G. F. Whence Cometh Tomorrow's Clinical Investigators? *Clin. Res.* **27**(1979):253–256.
2. U.S. Department of Health and Human Services. *On the Status of Medical School Faculty and Clinical Research Manpower.* Washington, D.C.: U.S. Department of Health and Human Services, 1981, pp. 7–9.
3. Wyngaarden, J. B. Encouraging Young Physicians To Pursue a Career in Clinical Research. *Clin. Res.* **31**(1983):115–118.
4. Funkenstein, D. H. *Medical Students, Medical Schools, and Society During Five Great Eras: Factors Affecting the Career Choices of Physicians, 1958–1976.* Cambridge, Massachusetts: Ballinger Publications Co., 1978.
5. Morris, W. W. *A Report on Attitudes of Senior Medical Students Toward Medical Education.* Curriculum Studies Report No. 8. Iowa City, Iowa: University of Iowa College of Medicine, 1977.
6. Morris, W. W. *A Report on Attitudes of Senior Medical Students Toward the Practice of Medicine.* Curriculum Studies Report No. 9. Iowa City, Iowa: University of Iowa College of Medicine, 1977.
7. *Medical Student Graduation Questionnaire Survey.* Washington, D. C.: Association of American Medical Colleges, 1978.
8. Levey, G. S., Lehotay, D. C., and Dugas, M. The Development of a Physician–Investigator Training Program. *N. Engl. J. Med.* **305**(1981):887–889.

Teaching Medical Students in Ambulatory Settings in Departments of Internal Medicine

JOAN FELTOVICH, M.A., TERRILL A. MAST, Ph.D., and NORMAN G. SOLER, M.D., Ph.D.

Abstract—Clinical training in ambulatory settings is an increasingly prominent topic in medical education, but most descriptions of internal medicine programs in the literature concern training for residents. The authors undertook a survey of departments of internal medicine to obtain and assess information about requirements for ambulatory clinical experiences for medical students. The results show that few departments (24% of the 101 departments responding) required ambulatory care experiences for undergraduates. Most of the required programs had a goal of broad exposure to ambulatory-patient problems; almost none had special educational interventions to complement students' care of patients. The experiences that were incorporated into the clerkship in a single block of time were more favorably rated than the experiences that occurred intermittently throughout the clerkship. Inability to provide continuity-of-care experience was an important concern of the departments. Most programs had logistical problems, the most serious and frequently cited being the lack of faculty time for teaching. The authors raise concerns about the educational effectiveness of many existing programs and, given the problems with faculty involvement, about the long-term viability of these programs. *Acad. Med.* 64(1989):36–41.

Clinical training in the ambulatory setting is an important and increasingly prominent topic in medical education. There has been much discussion about the reasons such training is needed—or even whether such training is needed—and the problems to be resolved to establish it successfully.[1,2] Changes in the economics and structure of health care delivery are reducing inpatient lengths of stay, constricting the mix of medical problems represented in the inpatient pool, and increasing the proportion of medical care being delivered in ambulatory settings. As inpatients become less available, there is an increasing need for the traditional clinical training in inpatient settings to be supplemented by training in outpatient settings. The long-term implication of these changes is a need for more physicians trained to deliver care in ambulatory settings. Training in ambulatory settings has relevance not only for students planning careers in primary care but also for those who will enter most other specialties or subspecialties; the proportion of care delivered in ambulatory settings in most specialties and subspecialties is on the rise.[3]

Departments of internal medicine that are considering undergraduate training in ambulatory settings have limited information to assist in their deliberations, because most available discussions of relevant issues have focused on graduate medical education. For example, problems addressed in the literature usually concern the financing, structure, certification, and accreditation of only graduate medical education in the ambulatory setting, although implications for undergraduate medical education can sometimes be drawn. Similarly, discussions of what should be taught[2,4,5] or how it should be taught[6,7] deal almost exclusively with residents' training. With a few exceptions[8,9] most specific programs described in the literature are also for residency training.[7,10] A recently issued final report of the Association of American Medical Colleges, *Study and Comparison of Transition of Medical Education Programs from Hospital Inpatient to Ambulatory Training Programs*,[11] also noted a focus on residency training by those interviewed during that study. One study of training in the ambulatory setting that focused on undergraduate education was a 1986 survey of departments of family practice, medicine, and pediatrics.[12] It revealed that departments of internal medicine offered ambulatory care courses (required or elective) far less frequently than did departments of family practice or pediatrics, and had relatively small numbers of students. Considering the long-term effects of economic and organizational changes in medical care, departments of medicine will need to provide more clinical education in ambulatory settings.

As an information resource and to guide the development of our own plans for clinical education in ambulatory settings, we conducted a survey to determine the status of requirements for training in ambulatory settings, what goals departments have for teaching in these settings, how their programs are organized, and

Ms. Feltovich is a researcher in the Department of Medicine and Department of Medical Education; Dr. Mast is assistant dean of continuing education; and Dr. Soler is professor of medicine; all at Southern Illinois University School of Medicine, Springfield.

Correspondence and reprint requests should be addressed to Ms. Feltovich, Southern Illinois University School of Medicine, Department of Medical Education (third floor), 801 North Rutledge, Springfield, IL 62702.

what problems they have encountered.

Method

We developed and pilot-tested a questionnaire regarding ambulatory care clinical experiences for medical students required by departments of medicine. In November 1986, it was mailed to the chairmen of the 129 departments of medicine in all medical schools and branch campuses in the United States that were listed in the *1986-87 AAMC Directory of American Medical Education*.[13] The chairmen were asked to forward the questionnaire to the clerkship director or other appropriate person for completion. A follow-up mailing occurred in February 1987.

The first section of the two-section questionnaire requested general information about ambulatory care training, such as whether there was a required ambulatory care component to the clerkship (or clerkships); whether other ambulatory care training was required in the department; plans for such training; the change in the number of inpatients available for education; and whether there was an ambulatory family practice clerkship in the school. The other section addressed specific information about required ambulatory care experience in the clerkship, if any, such as the duration of the ambulatory care component; the goals, structure, and orientation for the experience; how students were evaluated; and how the experience had been regarded by participants (students, faculty members, and program directors). In this part of the questionnaire, respondents were also asked to identify major problems encountered in organizing or conducting their ambulatory care training programs, the aspects of ambulatory care they considered to be most important for students to learn, and the aspects that have posed the most difficulty for students.

Results

The survey yielded general information about ambulatory care training and specific information about the programs required within departments of internal medicine. The specifics were characteristics, goals, and organizational structures of the programs; ratings of the programs by students, faculty members, and program directors; problems associated with the programs; and areas of training judged by directors to be difficult for students. Of 129 departments contacted, 101 (78%) responded.

Status

Of the 101 departments responding, 24 required ambulatory care experiences in the internal medicine clerkships. Another 20 offered courses that satisfied their schools' "selective" in ambulatory care training. In most cases, this selective could be fulfilled in family practice, medicine, or pediatrics, and took place during a four- to eight-week block of time. Fifty-seven departments reported having neither required nor selective ambulatory care experiences; however, 26 of these 57 were planning programs for ambulatory care training and nine of these were considering such plans for the future. (See Table 1.)

Table 1
Numbers and Percentages of 101 U.S. Medical School Departments of Internal Medicine, in Terms of the Status of Their Ambulatory Training Programs, Considering Options for Training Students in Ambulatory Settings, 1986–87*

Status of Departments	Options Under Consideration													
	Adding Ambulatory Electives		Developing a Selective		Adding within Clerkship or Creating Additional Clerkship		Planning in Progress (No Details Given)		Considering for the Future		No Plans		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Had a required ambulatory care experience	0	0	0	0	6	25.0	8	33.3	2	8.3	8	33.3	24	100
Offered a selective in ambulatory care setting	1	5.0	0	0	4	20.0	5	25.0	0	0	10	50.0	20	100
Had no required or selective ambulatory care experience	5	8.8	4	7.0	5	8.8	12	21.0	9	15.8	22	38.6	57	100

*Of 129 departments sent questionnaires, 101 responded.

Reasons for Ambulatory Care Training

We obtained information about three factors that may influence the incorporation of a requirement for ambulatory care training into the medicine clerkship: the availability of inpatients for instructional needs; belief in the efficacy of training in the ambulatory setting; and the presence of an ambulatory family practice or family medicine clerkship in the school. Only 30 of the 101 departments responding reported experiencing decreases in the numbers of inpatients available for medical education. These 30 comprised 50% of the departments that had requirements for ambulatory care training (12 of 24) and 28% of departments with no required or selective experiences (16 of 57). Sixty-eight respondents — representing 75% of departments with required ambulatory care experience, 70% of departments having selectives, and 63% of departments with no requirement or selective — felt that training in the ambulatory care setting can be educationally effective. Of the 101 respondents, 54 reported having required ambulatory family practice or family medicine clerkships at their medical schools during 1986–87. This total included 16 of the 24 departments that required ambulatory training in the internal medicine clerkship and 27 of the 57 departments that had no required or selective ambulatory care experience.

Characteristics

Twenty-four respondents described a total of 26 required ambulatory care components in their medicine clerkships. Of these 24 departments, 17 had components in junior-year clerkships; four had them in senior-year clerkships; two had them in both the junior and the senior clerkships (that is, two programs for each); and another had a program involving half a day per week for four years. Of these 26 different programs, 12 were block experiences that used from 7% to 50% of clerkship time, with a mean of 25%. The other programs took place one or two half-days per week for part or all of the clerkship, with the exception of two programs (one that involved half a day per week throughout four years of medical school, and one fourth-year program that permitted students to select either a six-week block of ambulatory care experience or half a day per week for 18 weeks).

Goals

The primary goal of most (92%) of the 26 required ambulatory programs described in the questionnaires was to provide the student a broad exposure to ambulatory problems in internal medicine and foster an awareness of the special aspects of delivering medical care in the ambulatory setting as opposed to the inpatient setting. In three cases, the ambulatory education experience was used to concentrate on developing skills in history-taking and physical examination. In only four cases did the goals specifically include ambulatory care education in subspecialties.

The 24 respondents that required training in ambulatory care were asked to list what they considered to be most important for students to learn during the ambulatory care experience. Seventeen of these respondents (65%) saw the experience as an important contrast to inpatient training, particularly with regard to how the ambulatory setting affects one's approach to problem solving and to patients (for example, establishing the relative priorities of problems and working within time constraints). Training in management and in psychosocial skills were also mentioned, but less frequently.

Structure

Most (23) of the 26 required ambulatory care experiences took place in clinic settings: general medicine clinics, clinics for sexually transmitted diseases, or other specialty clinics. Only three used private offices. Some programs included experience in two or more ambulatory settings. Eighteen of the 26 programs made use of a general medicine clinic for part of the ambulatory care experience. In all the reported programs, the students were usually supervised by attending faculty members or preceptors.

Program resources were used in different ways. In some cases, students were assigned two new patients per day in the clinic, for whom they did complete histories and physical examinations. Extensive time was then spent in presentation and discussion of these cases. Another program assigned students only one patient per clinic, and the student then studied that case in depth. However, most programs were designed to permit students to see a variety and number of outpatients in each clinic and to function much like attending physicians.

Only six (23%) of the ambulatory care training components were reported to have any special orientation or preparation for students. Moreover, only seven of the ambulatory care programs included educational experiences other than actual patient care that focused on issues and skills particularly germane to ambulatory care. The method of student evaluation most frequently used (in 20 of the 26 programs) was observation by the attending physician, but two or more methods for evaluating students were used for the ambulatory care components in eight of the clerkships.

Ratings

The respondents were asked how their programs had been rated (excellent, good, fair, poor, or not known) by students, faculty members, and program directors. The six programs that received the highest rating (excellent) by all three groups were compared with the four that received the next-to-lowest rating (fair; the category "poor" was not used) by all three groups. The relationship between program ratings and each of the following variables was examined: goals, structure, whether there was specific instruction or skill development for the particular experience, and types of problems experienced. The only apparent pattern was that most of the programs rated excellent (five of six) were those in which the ambulatory care component comprised a consecutive block of days for a portion of the clerkship.

In contrast, of the programs receiv-

ing only a fair rating, three of four involved one or two half-days per week throughout the clerkship rather than blocks of time. To test this relationship more generally across programs, in addition to those uniformly judged excellent or fair, values were assigned to the ratings reported for students, faculty members, and directors (fair = 1, good = 2, excellent = 3) and summed for each program. Those totalling 7 or more were classified as "above average," those with less than 7 were classified as "average or below." A chi-square test with Yates' correction indicated that the association between the ratings and the block or nonblock feature of the experience was significant at the $p < .05$ level; that is, block ambulatory experiences within the clerkship tended to be rated more favorably. It should be noted that the programs of the two respondents who reported continuity-of-care experiences that took place over extended periods (half a day per week for 18 weeks, and half a day per week for four years) had favorable ratings (8 and 6, respectively, using the numerical rating scheme described above).

Problems

The problems the departments cited with these ambulatory care teaching experiences were virtually all problems of time, space, and finances; they rarely concerned educational issues (for example, learning to evaluate complex, chronically ill patients), although many of the logistical problems could be considered educational as well ("It's difficult to keep the students working every minute of the day, given problems of patient flow, preceptor flow, and time, etc."). Problems relating to the time or commitment of faculty members were most frequently cited (for 10 of the 21 programs that had responses to this question). For example, some respondents mentioned that their programs were failing or being phased out because they had lost their directors or because there had been a change to a less-committed director. Many programs had difficulty finding enough physician participants and cited faculty members' lack of time to work with students as a problem. Cited less frequently (six of the 21 programs) were problems relating to the number or types of available patients, such as "recruiting patients to participate in the program" and "acquiring an adequate patient mix for valuable teaching."

The next most frequently-cited problem (in five of 21 programs) was a lack of clinic space to accommodate more students, or difficulty with clinic flow caused by lack of space (not having "enough rooms or enough money [to compensate] for what's inefficient practice"). Other responses (for nine of 21 programs) dealt with the scheduling of students for the experience or were general statements such as "the structure of the clerkship" that were not amenable to useful classification. Of the 26 programs, only one had no problem cited; on five questionnaires the item about problems was left blank. Another important concern identified in this section and in other areas of the questionnaire was both logistic and educational: the lack of experience in continuity of care. For example, one respondent noted the "difficulty in providing students with adequate continuity-of-care experience in the allotted time." Another respondent identified a problem resulting from this time constraint: "The student has limited feedback regarding patient management, outcome, etc."

Difficulties for Students

A question on the survey asked what aspects of ambulatory care posed the most difficulty for students. The most commonly cited aspect was learning to work within the time constraints of the ambulatory setting, particularly with regard to performing a focused history and physical examination. The other major area of difficulty frequently mentioned, a closely related one, was learning to rely on clinical data-gathering skills and problem-solving abilities to formulate reasonable diagnostic and therapeutic plans. In the words of one respondent, students "become much too used to relying on high-tech machine tests and laboratories to tell them what is wrong with their patients. Acute care experiences . . . tend to teach internists that every symptom or problem must have every possible disorder ruled out to a high level of resolution."

Discussion and Summary

The information obtained from the survey can be summarized in six main points. First, only one-fourth of the 101 schools responding required an ambulatory care experience in the department of internal medicine. These programs may have developed as a necessary response to decreasing numbers of inpatients. That is, half of the departments that already had such requirements indicated that they were experiencing decreases in the numbers of inpatients, or more limited ranges of cases, or both. Only 16 (28%) of the 57 departments with no requirement for training in ambulatory care reported decreases in inpatients. Although this relationship is suggestive, it is not statistically significant. The requirement for ambulatory family practice clerkships did not seem to influence whether internal medicine departments provided or were planning to increase ambulatory care experiences.

It has been argued in the literature that traditional inpatient clerkships may provide exposure to a limited range of cases and that a clerkship in ambulatory family practice can compensate for this limitation.[14] Such a clerkship could be seen as fulfilling a need to expose students to a more diverse case mix and obviating the need for ambulatory care experience in the medicine clerkship. In fact, a weak pattern in the opposite direction was disclosed by responses to the questionnaire. Sixty-seven percent of the schools that required ambulatory care components in medicine also required clerkships in ambulatory family practice. Again, this requirement may reflect necessity, in that some departments were experiencing declines in the numbers of inpatients and may have needed to make use of other settings. On the other hand, it may reflect a departmental goal of providing

discipline-specific education in ambulatory settings. Of the 57 departments with neither required nor selective experience, only 47% had required clerkships in ambulatory family practice at their schools.

Most respondents, whether their departments required ambulatory care education or not, considered such experiences to be valuable, and 61 departments (60% of the total respondents) were making plans to increase training in ambulatory settings or were considering doing so in the future.

Second, of the 26 required programs, nearly all (24, or 92%) had a primary goal of providing students broad exposure to ambulatory patients' problems. Although only four departments included goals of education in subspecialties, the usefulness of giving students ambulatory training within subspecialties should not be overlooked by departments planning ambulatory care programs, given that many conditions treated by subspecialties are increasingly being treated in outpatient settings rather than in the hospital.

Third, few (seven, or 27%) of those with ambulatory care training requirements mentioned any special educational interventions to support or complement their students' actual patient-care experiences. In most cases students appeared to have been accommodated by existing outpatient clinics and patterns of teaching, rather than being taught in new programs especially designed to yield particular educational benefits related to clinical medicine in the ambulatory setting.

Fourth, for required ambulatory care training within the clerkship, students, faculty members, and program directors tended to rate block experiences more favorably; they tended to rate less favorably experiences involving only one or two half-days a week during the clerkship.

Fifth, almost all of the existing programs were in school-run clinics (23, or 88%) rather than private clinics (three, or 12%).

Finally, most programs (18, or 69%) suffered some logistics problems, which were often serious. The most frequently cited problem was lack of faculty commitment and time for teaching. Another was lack of sufficient numbers of patients or types of cases. Lack of continuity-of-care experience was also seen as a problem. However, a small number of respondents noted no major problems and appeared to have very successful programs. These clearly deserve further exploration.

These findings raise two significant concerns. First, since most of the required programs operated without orientation sessions or other instructional experiences specifically designed to meet the educational goals of ambulatory internal medicine, there is cause for concern about the educational effectiveness of these programs. Exposing students to ambulatory care is not the same as educating them in ambulatory settings. Second, the serious problems being experienced by many programs, particularly the problems of faculty commitment and time for teaching, raise concerns about whether these programs will survive.[15]

Some potential solutions to these problems have been proposed in the literature. Effectively recruiting and retaining faculty members for ambulatory care education might be brought about by providing incentives for research in ambulatory medicine, providing greater rewards for teaching in ambulatory care settings, or making greater use of private physicians.[1,12] Another alternative would be to greatly increase students' clinical competence before the clerkship years so that they can be an asset rather than a hindrance to clinic productivity and physicians' productivity in ambulatory settings.[16] The problem of limited number and types of outpatients might be resolved as departments develop ambulatory sites for teaching other than hospital outpatient clinics, for example, private offices, community clinics, and health maintenance organizations.

The educational benefits of extended continuity-of-care experiences, which are difficult to provide during a relatively short medicine clerkship, may have to be delayed until postgraduate training or acquired through other parts of the curriculum. Lack of experience in continuity of care is a noteworthy concern because the same problem is often encountered in training in inpatient settings, and those involved sometimes suggest that this aspect of training would be carried out better in ambulatory settings. However, the results of the questionnaire suggest that even when ambulatory settings are used, the problem remains. The time and structural constraints of internal medicine clerkships apparently limit the opportunities to follow up patients, either in the clinic as outpatients or in the hospital — in the case of an outpatient who must be admitted to the hospital. As a result, the student has limited feedback regarding the outcomes of management decisions or the effects of patient–physician interaction on the overall care of the patient.

One solution to this problem may be school-wide required programs that extend over several months or years and enable students to care for a panel of patients over time.[17] Clerkships with block ambulatory care components may be able to provide some continuity experiences for students. For example, one of our respondents described a successful program conducted within a medicine clerkship, involving six weeks of a 12-week clerkship and enabling students to follow their outpatients who were admitted to the hospital. This program received uniform ratings of "good" and was reported to have experienced no problems.

The information from this survey strengthens our conviction that the amount of teaching in ambulatory settings inevitably will increase. Although our report is descriptive rather than prescriptive, several implications for developing programs can be inferred. The educational goals for these programs need to be clearly identified, and specific instructional events or activities should be carefully designed to prepare students for their ambulatory care training and to focus their attention on the specific

educational reasons for being there. For departments planning to incorporate ambulatory care training within the clerkship, a block experience may prove to be more successful than periodic short experiences. Because of time limitations and the nature of the chronic medical problems with which internal medicine deals, continuity-of-care goals are probably not achievable in programs embedded within internal medicine clerkships. Initial problems caused by insufficient numbers of outpatients are likely to be resolved over time. However, the lack of committed faculty time for teaching is a more serious problem, and creative avenues to approach it need to be explored. Although it may be possible for ambulatory care teaching to continue in some form, even under suboptimal conditions of space or financial support, faculty involvement is always necessary.

The work reported here was supported in part by the Schering-Plough Foundation through a grant to the National Fund for Medical Education.

References

1. Perkoff, G. T. Teaching Clinical Medicine in the Ambulatory Setting: An Idea Whose Time May Have Finally Come. *N. Engl. J. Med.* **314**(1986):27-31.
2. Schroeder, S. A., Showstack, J. A., and Gerbert, B. Residency Training in Internal Medicine: Time for a Change? *Ann. Intern. Med.* **104**(1986):554-561.
3. Aiken, L. H., et al. The Contribution of Specialists to the Delivery of Primary Care: A New Perspective. *N. Engl. J. Med.* **300**(1979):1363-1369.
4. Wones, R. G., Rouan, G. W., Brody, T. L., Bode, R. B., and Radack, K. L. An Ambulatory Medical Education Program for Internal Medicine Residents. *J. Med. Educ.* **62**(1987):470-476.
5. Kroenke, K. Ambulatory Care: Practice Imperfect. *Am. J. Med.* **80**(1986):339-342.
6. Girard, D. E., Elliott, D. L., Linz, D. H., and Cooney, T. G. The General Medicine Clinic: Making the Ugly Duckling Fly. *Arch. Intern. Med.* **144**(1984):2217-2219.
7. Goodson, J. D., et al. The Training of Physicians Outside the Hospital. *Arch. Intern. Med.* **146**(1986):1805-1809.
8. Berenbaum, I., et al. Teaching and Funding of Primary Care Education in Third-Year Clerkships. *J. Med. Educ.* **59**(1984):730-738.
9. Marion, G. S., and Celestino, F. S. A Model for Teaching Medical Students Ambulatory Care Geriatrics. *Fam. Med.* **19**(1987):382-383.
10. Brook, R. H., et al. Educating Physicians and Treating Patients in the Ambulatory Setting: Where Are We Going and How Will We Know When We Arrive? *Ann. Intern. Med.* **107**(1987):392-398.
11. Seline, Nancy S. *Study and Comparison of Transition of Medical Education Programs from Hospital Inpatient to Ambulatory Training Programs.* Final Report. Washington, D.C.: American Association of Medical Colleges, 1987.
12. Meadows, J. C., Bauer, R. L., and Diehl, A. K. Private Physicians in Ambulatory Care Training in U. S. Medical Schools. *J. Med. Educ.* **61**(1986)437-443.
13. Wilson, V. (ed.). *1986-87 AAMC Directory of American Medical Education.* Washington, D.C.: Association of American Medical Colleges, 1986.
14. Parkerson, G. R., Muhlbaier, L. H., and Falcone, J. C. A Comparison of Students' Clinical Experience in Family Medicine and Traditional Clerkships. *J. Med. Educ.* **59**(1984):124-130.
15. Gary, N. E. Barriers to Medical Student Education in Ambulatory Settings. *J. Med. Educ.* **62**(1987):527-529.
16. Barrows, Howard S. *Simulated (Standardized) Patients and Other Human Simulations.* Chapel Hill, North Carolina: Health Science Consortium, 1987.
17. Gravdal, J., and Glasser, M. The Integration of the Student into Ambulatory Primary Care: A Decade of Experience. *Fam. Med.* **19**(1987):457-462.